

Remarks

Claims 1-35 remain in the present application under active prosecution.

Applicants thank the Examiner for the very thorough and carefully crafted Office Action. Applicants acknowledge the fact that claims 5-17 and 30-34 have been indicated as covering allowable subject matter.

The Examiner has objected to claims 23 and 24 for failing to further limit the subject matter of a previous claim. This objection appears to stem from the fact that claim 23 was not actually dependent from any claim (i.e., the claim number of its dependency was left out). Claim 23 has now been amended to clarify that it depends from claim 18. Claim 24 continues to depend from claim 23. Since claims 23 and 24 now clearly limit claim 18, it is respectfully submitted this claim objection has been overcome.

The Examiner has rejected claim 28, under the second paragraph of 35 U.S.C. §112, stating that the phrase “each of the first analyser units” does not have antecedent basis in any preceding claims. This phrase does not appear to be necessary in order to identify fully what is meant by the phrase “first estimation values” and, therefore, it has been eliminated from claim 28. In view of this amendment, it is submitted that the rejection under 35 U.S.C. §112 is no longer applicable and it is respectfully requested that it be withdrawn.

Finally, the Examiner has rejected claims 1-4, 18-29 and 35, under 35 U.S.C. §102(b), based on the disclosure of U.S. Patent 5,719,565 (Tsuno et al). For the reasons given below, that rejection is respectfully traversed.

Claims 1, 18 and 35, which are the independent claims of the present application and from which all other claims in the application depend directly or indirectly, all require a sensor imperfection estimation or a means for providing such a sensor imperfection estimation. Applicants respectfully submit that the Tsuno patent does not disclose or suggest a sensor imperfection estimation. The filter processor A6a of Tsuno, which performs the filtering step 140 described in equation (1), is not a sensor imperfection estimation unit. This is because the filter is not at all capable of determining or estimating the part of the signal which stems from

sensor imperfections. The filter merely deletes all low frequency components equally, irrespective of the source of the signal component. Tsuno states that the filter is a high-pass filter for extracting only predetermined high frequency components (see column 6, lines 2-3) i.e., only frequencies greater than, for example, 20-30 Hz (see column 6, lines 8-9). Such a filter is not able to determine and extract the signal components which stem from sensor imperfections.

In contrast, the sensor imperfection estimation section of the present invention is a means for determining the signal component produced by sensor imperfections. This sensor imperfection estimation permits the elimination of components stemming from sensor imperfections from the entire signal, leaving other signal components, for example, those which arise from the tire road contact and which are beneficial for the ground condition estimation, unchanged. The claimed invention achieves this estimation of sensor imperfections by computing a weighted average (see page 10 of the present application, "sensor imperfection estimation section") which extracts the repetitive signal components stemming from the sensor imperfections from the entire signal.

The method described in the Tsuno patent, where the high frequency components of the wheel acceleration are extracted and used to detect the road surface condition, removes the low frequency noise caused by the vehicle deceleration and brake fluctuation components and filters out the high frequency components of the road surface conditions. This means that the wheels need to accelerate/decelerate in order for the described method to work. The sensor imperfection estimation utilized in the present application, which works in a completely different way, does not require such special circumstances and applies to all driving conditions.

In this regard, and as supporting evidence, the PCT written opinion on the patentability of the present application notes that the Tsuno patent is the closest piece of prior art, and that the claims of the present application are patentable over Tsuno, because Tsuno does not disclose any sensor imperfection estimation section, contrary to the requirements of the claims of the present application. Based on the absence (or suggestion) of this required element, it is submitted that the rejection, under 35 U.S.C. §102(b), based on the Tsuno patent, should be withdrawn.

It should also be noted that there are additional features in claims 2-4 and 19-29 which are not disclosed in Tsuno (please note that the following is not an exhaustive list of these


features). For example, claims 2 and 19 require that a sensor imperfection value is estimated for each of the segments of the rotary element. No such element is disclosed or suggested in Tsuno. The specific passage which the Examiner refers to in the Office Action with respect to this element (column 6, lines 49-52 of Tsuno) relates to determining the variance of the signal which is indicative of a bad road condition, not determining sensor imperfection values. In addition, claims 3 and 20 require that the sensor imperfection value be a weighted average of sensor imperfection values of previous and current revolutions of the rotary element. In contrast, in Tsuno, the signal is high pass filtered, i.e., frequency filtered, without differentiating between the different sensor elements. Finally, claims 4 and 21 define the specific formula by which the imperfection estimation value is calculated for each sensor element. In this formula, the individualization of the sensor elements is realized by taking the modulus of the sample number n , i.e., by the index $(n \bmod L) + 1$ of the imperfection values. No such formula is disclosed or suggested in the Tsuno patent. The use of frequency filtering does not allow the estimation of individual imperfection estimation values for the sensor elements in the Tsuno patent.

Since the Tsuno patent is silent about sensor imperfection estimation, a required element of all claims of the present application, as well as the other elements discussed above, Tsuno cannot anticipate or render obvious the subject matter of these.

In view of the foregoing, it is respectfully submitted that the claims pending in the present application, as amended herein, are now in form for allowance. Accordingly, reconsideration and allowance of those claims are earnestly solicited.

If, in reviewing those claims, the Examiner determines that there are additional issues or a minor nature which need to be addressed before the claims can be passed to allowance, he is invited to contact the Applicant's attorney using the contact information given below, so that those issues can be addressed expeditiously and the claims can be passed to issue.

Respectfully submitted,
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